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ABSTRACT

Difficulties facing learning disabled (LD) students in problem solving are reviewed and an approach is proposed to help them make better use of the learning strategies available to them. A cognitive learning style approach to LD students is introduced, followed by an analysis of problem solving and the stages of information processing (attention, perception, memory, thinking, and problem solving). Three types of deficits in LD students' problem solving are identified and their learning implications noted: (1) memory deficits, (2) field dependence, and (3) impulsivity. A reference list is included. (CL)

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DEFICITS IN PROBLEM SOLVING OF LEARNING DISABLED CHILDREN: A COGNITIVE LEARNING STYLE APPROACH

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1. INTRODUCTION AND STATEMENT OF PROBLEM

Although, as a group, learning disabled children reveal a heterogeneous image, it can be postulated that the most obvious characteristic manifested within the teaching-learning situation is the fact that these children's achievements are contrary to what is expected from them by their educators (Melis, 1981: 5; Dumont, 1971: 11; Hallahan and Kauffman, 1982: 93; Meyers and Hammil, 1969: 4). This means that there is a discrepancy between the factual and actual and the potential possible learning results (Dumont, 1971: 15, 38; Wallace and McLoughlin, 1979: 26; Van Meel, 1968: 1; Gearheart, 1976: 8; Lerner, 1981: 9; Faas, 1981: 4). The problematic nature of this situation brings forth the challenge of the most effective aid to these children, aid directed towards the total or partial elimination of the discrepancy.

Traditionally the variety of views on learning disabilities may be separated into two approaches, viz the process and task directed approaches (Melis, 1981 : 24). Within the process directed view the focus is on the diagnosing of and aiding in terms of the deep-seated factors seen as resulting in learning disabilities. These factors include deficits of the sensory neurological, the senso-motor and the semantic verbal functioning of the child. On the other hand, the task approach is directed towards the school achievements, that is the specific conditions the child has to comply with in order to participate adequately in the specific act or task of learning. Concerning reading problems, for example, attention will be given to aspects such as auditory discrimination of words and sounds, auditory analysis and synthesis, auditory sequential memory, visual discrimination of graphemes, all of these aspects concerned with the specific learning task, namely reading.

Now there is evidence that LD children are not always deficient in attention, memory and thinking abilities as such, as much as they are lacking in task approach skills (Hallahan and Kneedler, 1978: 449). They seem to be at a

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disadvantage in knowing how to go about engaging in tasks that require attention, memory and thinking skills. What is obvious in many cases is the chaotic approach of many of these children when confronted with a learning task, especially with problem solving (Bus, 1979: 384) as will be indicated later. Hallahan and Kneedler (1978: 449) are of the opinion that once provided with appropriate task strategies, they perform at a level comparable to that of their normal peers. It thus seems to be logical to assist these children to make a better use of the learning strategies available to them (Melis, 1981:27).

What should be concentrated on therefore is what happens with the LD child between the presentation of the learning material or information and the eventual answer produced. So, how the information intake and processing take place and the kind and nature of the learning acts taking place should be the focal point of the diagnosis and remediation of the learning problems (Melis, 1981: 20). In other words, knowledge of the cognitive learning style functioning of the LD child ought to lead to a better insight and understanding of the problematic nature of learning disabilities.

2. WHAT IS UNDERSTOOD BY A COGNITIVE LEARNING STYLE APPROACH TO LEARNING DISABILITIES

Shapiro (Van Meel, 1968: 184) defines style as a form or way of functioning that can be identified in an individual and that covers a wide area of his actions. As far as this paper is concerned, style is seen as the way in which the child functions and therefore not as a specific preference that determines the way of functioning as indicated by certain writers (Floyd, 1979: 10).

Various writers indicate that cognitive style (especially learning style) and information processing cannot be separated as the manner of information processing is typical of a specific learning style and vice versa. Odom et al. (1971: 883) give the following description, "... cognitive style refers to the manner in which an individual is predisposed to process information in particular tasks", while Floyd (1979: 49) says, "Cognitive styles are sometimes described as 'information-processing habits'." (Also see Cherkes, 1983: 95).

It seems that cognitive learning style is generally used to include different information intake and processing procedures. It is further clear that cognitive styles are an important source of individual differences in the learning of scholastic skills such as arithmetic, reading,spelling and the processing of information in the cultural subjects.

As the aim of this paper is to indicate certain deficits in problem solving of learning disabled children from a cognitive learning style approach, brief attention will first be given to the task of problem solving in general.

3. PROBLEM SOLVING: A COGNITIVE LEARNING STYLE APPROACH

As was suggested previously, after the presentation of the learning material (S or input) certain processes are implemented before the answer (R or output) is given, which may be illustrated as follows:

Learning material (S/input) $\xrightarrow{?}$ $\xrightarrow{?}$ $\xrightarrow{?}$ $\xrightarrow{?}$ $\xrightarrow{?}$ Answer (R/output)

To illustrate the above principle in terms of problem solving a series of steps in processing information (Yussen and Santroc, 1982: 201) can be indicated, viz:

S $\longrightarrow$ ATTENTION $\longrightarrow$ PERCEPTION $\longrightarrow$ MEMORY $\longrightarrow$

$\longrightarrow$ THINKING $\longrightarrow$ PROBLEM SOLVING $\longrightarrow$ R

The above is one possible set of stages of information processing when a child is confronted with a problem solving task.

Yussen and Santroc (1982: 200-201) use the following example to illustrate the possible stages of information processing:

The teacher writes an algebra equation "2 x + 10 = 34. Solve for x " on the board (S) for a well-seasoned algebra student to solve. The student looks up and notes that something has been written on the board (attention).

This "something is then determined to be a series of numbers, letters and signs and - at a higher level of identification - two simple statements: (1) "2 x + 10 = 34" and (2) "Solve for x" (perception). The student must preserve the results of this perceptual analysis over a period of time (memory) even if only for a brief interval needed to write the problem on a worksheet.

The student then begins to elaborate on the product of perception and memory (thinking). A possible way of reasoning might be the following: "Oh! It's an equation - x is the unknown, and I'm supposed to figure out the value of x. Let's see. How do I do that?" And the final level of analysis (problem solving) addresses this question: "How do I do that?" Problem solving then might take the following form: "Okay, 2x + 10 = 34. First I have to collect the unknown on one side of the equation and the known values on the other side. To do this, I'll leave the 2x where it is - on the left. Then I'll subtract 10 from each side to remove the 10 from the left. This leaves 2x = 24. Now I have to express the equation as 'x = something', and it's solved. How do I do this? I know! Divide each side by 2 and that will leave 1x, or x, on the left side. Now I have x = 12. That's the answer."

The cognitive learning style or information processing approach, then, is concerned with the nature of information children pick up from the vast body of stimuli encountered, the various steps involved in this pickup and the mechanisms or processes by which the information is absorbed and transformed (Yussen and Santroc, 1982: 201).

4. DEFICITS IN PROBLEM SOLVING OF LEARNING DISABLED CHILDREN

Three types of deficits in the problem solving of learning disabled children will be dealt with briefly to illustrate their dilemma in this field, namely memory deficits, field-dependence and impulsivity. These deficits all have a negative influence on problem solving.

4.1 Memory deficits

Referring to various writers Hallahan and Kneedler (1978: 450) state that LD children perform similarly to their younger normal

peers, i.e. they do not use strategies such as verbal rehearsal or organization cues to help them on recall tasks. Houck (1984: 35) adds that defects are also caused by a lack of or failure to use rehearsal strategies as well as information recording or re-organization (e.g., grouping digits together, "chunking", and so on). Also Cermak (1983) proposed that learning disabled children are delayed in the development of their ability to detect and utilize those features of verbal information that allow for adequate retention and retrieval of this material. They process information more slowly and they do not discern the content of that information as distinctly as do normal learners.

Storage and retrieval of material or facts, in order to have a knowledge repertoire available, is absolutely necessary whenever a child has to solve any problem. This means that many LD children simply cannot even getoff the mark when they are confronted with a problem solving task.

The major underlying factor contributing to the LD child's poor memory performance is his inability to use strategies that would make these tasks easier. Two of the most common strategies, often used by the nonhandicapped, are rehearsal and repetition. When rehearsing, however, the material should be organized in some way to aid the memory (Hallahan, et al., 1985: 87).

4.2 Field dependence

Field dependence and field independence relate to the way in which the person perceives and more specifically to the extent that the surrounding field (or background) within which the object is placed (foreground or figure) influences him. Concerning learning, the learning matter (be it visual, auditory, kinesthetic, tactile, olfactory, gustatory or inter-modal) within the specific learning situation constitutes the figure and therefore is the focal point of the perception, but this relevant matter is to a lesser or greater extent surrounded by or included in a field of at that moment irrelevant aspects. In order to execute the learning task effectively the learner has to direct

himself in such a way towards the learning matter that what is not relevant is excluded from the perception. Thus he acts field independently and not field dependently.

Perceptual independent achievers are therefore characterised by activity and independence in relation to the environment (Melis, 1981: 51). In this connection Roberge and Flexer say, "... a field-independent cognitive style is characterized by an analytic approach to a stimulus context that is reflected in the ability to restructure a perceptual field and extract salient features from the embedding context."

According to Witken (Melis, 1981: 51) a field-dependent person is characterised by a passivity in his contact with the environment. This results in "a global mode of perception that is manifested by the inability to separate part of a perceptual field from the field as a whole," according to Roberge and Flexer (1984: 227).

A variety of studies confirm that the LD children experience problems in concentrating on task-relevant information and ignoring the task-irrelevant (Torgesen, 1980; Weisz et al., 1975; Stuart, 1967; Druker en Hagan, 1969; Hagen, 1967). In this connection Hallahan and Reeve (Koegh, 1980: 156) state, "... it appears that the most parsimonious explanation for the learning disabled child's tendency to have problems in attending to relevant ones and ignoring irrelevant ones is his inability to bring to task a specific learning strategy..." and further, "... it is not so much the learning disabled child's inability to attend selectively that is his basic problem so much as it is his inability a analyze the task in terms of the best strategies needed for performing it."

Obviously field dependence has a very negative bearing on learning achievement. Recent investigations have produced equivocal findings about the relationship between field dependence-independence and the achievement of students (Roberge and Flexer, 1984: 228). This also holds true concerning problem solving where the relevant facts must be focused on while ignoring the non-important or irrelevant.

However, if the LD child is provided with appropriate strategies

it is most possible to have an effect on concentrating on what is relevant and to demonstrate the selective attention ability comparable to his normal peers (Hallahan and Kneedler, 1978: 452) Davey (Richek et al., 1983) suggested that field-dependent students needed explicit directions and guidance in doing assigned tasks.

4.3 Impulsivity

Already in the early sixties the research of Kagan and his co-workers on reflexivity and its counterpart impulsivity by inter alia using the Matching Familiar Figures Test (MFF), created wide interest in this cognitive style aspect (Melis, 1981: 69).

Reflexivity may be seen as an attitude towards reflecting on the adequacy of different possible solving hypotheses and to think about the quality of a possible answer (Melis, 1981:71; Soppe, 1975: 338; Kagan et al., 1966: 583), in other words to evaluate the validity of the different answers. Whenever a number of response alternatives are simultaneously available and uncertainty as to the correct response is high some children (reflectives) delay responding until the alternatives have been considered, and they have a high probability of being correct (Kendall and Finch, 1978: 110).

Impulsivity indicates a way of reasoning where the child takes up the first probability that comes up and/or answers without the proper reflection on the possible validity of the answer. Mostly such an answer is wrong but the person is minimally concerned about mistakes and responds quickly. (Melis, 1981: 71; Soppe, 1975: 389; Kagan et al., 1966: 583; Kendall and Finch, 1978: 110). Another variable linking up with reflectivity and impulsivity is conceptual tempo which refers to the degree to which an individual reflects on alternative response possibilities in problem-solving tasks involving some degree of uncertainty (Bush and Dweck, 1975: 567). Thus, reflexives are those whose answering time lies above the median answering time and who at the same time make a number of mistakes lying under the error median. The answering time of the impulsives lies under the median answering time while the number of errors lie above the errormedian. Of course there are those using a short searching time

and making few errors, and those who use a long time searching but make many errors because of ineffective searching strategies (Melis, 1981: 70; Mann, 1973: 274; Odom et al., 1971: 883; Messer, 1970: 724).

LD children are usually described as impulsive and as Ault et al. (1972: 1412) put it, "... they have less adequate strategies for searching the stimulus complex." Various researchers also indicate impulsivity as an important co-resulter for the development and manifestation of learning disabilities. Being impulsive seems to be a cognitive style dimension having negative effects on the achievement of children especially in the long run (Melis, 1981: 78).

Many researchers however have found that an impulsive nature or work habit in LD children can indeed be changed by mastering various applicable strategies and also by direct teaching of reflection. Of importance in this respect is inter alia the reflective model set by the adult directed to specific task approaches (Denny, 1972; Kagan et al., 1966), the acquisition of self-verbalising procedures (Meichenbaum and Goodman, 1971; Gondema, et al., 1984), the teaching of more effective search strategies (Egeland, 1974), the forced delay of responses (Heider, 1971), all of the foregoing being forms of cognitive behaviour modification.

5. CONCLUSION

LD children find problem solving extraordinarily difficult to master. This is not always because they have deficits in attention, memory and thinking skills per se, but rather because they lack the implementation of adequate strategies to fulfil the learning task effectively. An approach from a cognitive learning style functioning can be of tremendous assistance in obtaining a better insight into the problematic nature of children with learning disabilities. Many of these children have the human potential to learn adequately, but they must be educated to do so in the proper way.

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